

CLAIMS

1. A medical viewing system for displaying a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel, which guide-wire has a guide-wire tip that is contrasted with respect to the guide wire, this system comprising acquisition means that acquires an original sequence of noisy images called live sequence and processing means for processing said live sequence of images in real time, the processing means comprising:
 - 10 first means (10) for automatically detecting the guide-wire tip, yielding skeleton information of the guide-wire tip and a field of motion vectors based on said skeleton information;
 - second means (20) for automatically registering the guide-wire tip with respect to a reference based on the field of motion vectors and for enhancing the guide-wire and the vessel walls while blurring the background in the registered images; and comprising:
 - 15 Display means for displaying a live sequence of processed images.
2. The system of Claim 1, wherein the first means comprises means for spatially extending the skeleton, means for matching the current skeleton to a skeleton of reference, means to estimate the matching motion and means to extrapolate this motion to a full region of interest (ROI).
 - 20 3. The system of one of Claims 1 or 2, wherein the computing means comprises: Selecting means for selecting a Region Of Interest in the sequence of images comprising the guide-wire tip, and processing the data in said Region Of Interest.
 4. The system of Claim 3, having control means for a user to activate, to control the duration or to stop the processing means applied to the sequence of images in connection to a selected instant of the sequence, comprising starting means and stopping means for the user to activate or stop, at said selected instant, the processing means applied to the sequence of images for improving the visibility of the selected Region Of Interest.
 - 25 5. The system of one of Claims 1 to 4, wherein the enhancing means comprises ridge enhancement means and temporal integration means for enhancing line-like structures and blurring the background.
 6. The system of one of Claims 1 to 5, wherein the enhancing means comprises: zooming means for zooming on the Region Of Interest.
 - 30 7. The system of one of Claims 1 to 6, wherein the display means comprises:

registering means (41) for further registering a live sequence of processed images with respect to a sequence of corresponding images called peri-interventional, in order to form a new live sequence (R'(t)) on which the features of the peri-interventional images are superimposed.

- 5 8. The system of one of Claims 1 to 6, wherein the display means comprises: registering means (41) for further registering a live sequence of processed images with respect to a sequence of corresponding images called peri-interventional images, in order to form a new sequence of peri-interventional images (J'0-J'n) on which the features of the live images are superimposed.
- 10 9. The system of one of Claims 7 or 8, wherein the peri- interventional images are first registered in a referential formed by two patient's characteristics and the live processed images are further registered with respect to said first registered peri- interventional images.
10. The system of Claim 9, wherein the patient's characteristics are a breathing characteristic and a heart pulse characteristic.
- 15 11. A computer executable image processing method to be used in a system as claimed in one of Claims 1 to 10.
12. A device comprising a suitably programmed computer or a special purpose processor having circuit means, which are arranged to process images, to be used in a system as claimed in one of Claims 1 to 10.
- 20 13. A computer program product comprising a set of instructions for carrying out an image processing to be used in a system as claimed in one of Claims 1 to 10.
14. A medical examination imaging apparatus having means for acquiring a sequence of medical images and having a viewing system for processing and for displaying said sequence of images according to one of Claims 1 to 10.